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AUTHOR	Gao, Hong; Hughes, William W.; O'Rear, Michael R.; Fendley, William R., Jr.
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ABSTRACT

Studies have provided conflicting findings on who is more likely to graduate or to persist in higher education. This study examined differences between native students and transfer students in terms of graduation and retention rates, sought to discover factors that impact students' persistence in higher education, such as a student's first-term grade point average (GPA), overall average GPA, age, gender, race, and residency (in-state versus out-of-state). The study aimed to develop a systematic and comprehensive model to determine the extent to which these factors interact and influence graduation and retention rates. All undergraduate degree-seeking students enrolled at an institution for the first time in fall 1994 were selected for the study. Of this group, 2,545 were first-time freshmen, and 1,194 were transfers. Findings agree with those from other studies that first-term academic performance is crucial for both native and transfer students in terms of their graduation and persistence. It also indicates that transfer credit hours do make a difference in graduation and retention rates. Transfer students who transferred less than 32 credit hours are less likely to graduate than native students, while transfer students with 32 or more credit hours transferred graduate at a significantly higher rate within 4 years than do native students. Structural equation models also indicate that transfer credit hours have a strong effect on transfer student graduation and retention rates. In agreement with other studies, this study finds that student ethnicity, sex, and age had no effect on student graduation or retention rates, but student academic performance did. (Contains 6 tables, 4 figures, and 17 references.) (SLD)

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Developing Structural Equation Models to Determine Factors Contributing to Student Graduation and Retention: Are There Differences for Native Students and Transfers?

by

Hong Gao, Ph.D.
Research Associate
Collin County Community College
hgao@cccd.edu

William W. Hughes
Programmer Analyst Senior
billy@oir.ua.edu

Michael R. O'Rear, Ph.D.
Associate Director
mike@oir.ua.edu

William R. Fendley, Jr., Ph.D.
Director
bill@oir.ua.edu

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Abstract

Studies have provided conflicting findings on who is more likely to graduate or to persist in higher education. This study examines differences between native students and transfer students in terms of graduation and retention rates, seeks to discover factors that impact students' persistence in higher education such as a student's first-term GPA, overall average GPA, age, gender, race, and residency (in-state vs. out-of-state), and intends to develop a systematic and comprehensive model to determine the extent to which these factors interact and influence graduation and retention rates.

Developing Structural Equation Models to Determine Factors Contributing to Student Graduation and Retention: Are There Differences for Native and Transfer Students?

Retention and graduation rates are often used as indicators of the performance of colleges and universities. Studies have been conducted to explore how to improve retention and graduation rates. One important area of study focuses on comparisons of these rates between transfer students and native students in order to discover factors that affect students' persistence.

However, over the past thirty years, the results of the studies on native and transfer students have provided conflicting data on this topic. Compared with native students (first-time freshmen), some studies portray an optimistic view (Belcheir, 2000; Vaughn & Templin, 1987; Richadson & Doucette, 1980). Other studies paint a very pessimistic picture of transfer student success (Adelman, 1992; Dougherty, 1992). For example, a study from Kent State University shows that the baccalaureate graduation rate of transfers was equal to, or better than, a matched population of native students (Anglin, Davis, Mooradian, 1993). Transfers at Boise State University were almost seven times more likely than freshmen to graduate after four years and four times as likely to graduate after six years (Belcheir, 2000). Porter (1999) concluded in his study of student performance at four-year institutions that transfer students, as a group, performed less well than native students on all four outcome measures: retention rate, graduation rate, average grade point, and academic dismissal rates. Owen (1991) and findings from the Office of Institutional Research at James Madison University assert the same results from their studies of transfers and native students at three campuses of the University of Colorado System and the James Madison University, respectively.

This study is conducted to reveal factors that contribute to improving graduation and retention for native students and transfers by examining a sample from The University of Alabama, a mid-sized Southern university. It has more than 15,000 undergraduate students with nearly a quarter of them transferred from other colleges or universities. This study compares graduation and retention rates between native students

and transfer students and endeavors to discover the factors that contribute to any differences, at the institution.

Factors Associated with Graduation and Retention

Pantages and Creedon (1978) reviewed 25 years of research on college students and identified demographic, academic, motivational, personality, college environment, financial, and health variables as being related to attrition. In recent studies, researchers have highlighted the importance of first semester GPA in predicting graduation and retention rates (Belcheir, 2000, 2001). A study by Volkwein and Gerken (2000) suggested that freshman year experiences were more important in explaining outcomes than precollege characteristics, with the exception of GPA, which was almost equally predicted by precollege and college variables. Based on the findings of a survey of 294 institutions, the Consortium for Student Retention Data Exchange (CSRDE) reported that approximately 40 percent of students dropped out of college over a period of six years, with 20 percent dropping out in the first year (CSRDE, 2000). Braunstein and McGrath (1997) found that academic performance was overwhelmingly the most significant factor affecting a freshman's decision to continue, as poorly performing students tended to drop out.

It is frequently found that graduation and retention rates were lower for males and underrepresented minorities (CSRDE, 2000; Maryland Higher Education Commission, 2000; University of South Carolina, 2000). Peltier, Laden, & Matranga (1999), in their reviews, indicated that background variables such as being White or Asian American have been associated with persistence, while being older interfered with persistence, e.g., more commitments outside of school. The findings have been mixed with respect to gender with some support for higher persistence rates for females. However, Malette and Cabrera (1991) have suggested background factors exerted no significant direct effects on retention.

This study examines native and transfer student graduation and retention based on the effects of students' academic performance, measured by first term GPA, second term GPA and cumulative UA GPA, and demographic background composed of sex, ethnicity, age, residency.

Research Questions

This study focuses on the following questions:

(1) do transfer students graduate and earn bachelor's degrees at the same rate as native students?

(2) what is the relationship between transfer and native student's graduation and retention rates, and first-term GPA, second term GPA, UA cumulative GPA, age, gender, race, and residency (in-state vs. out-of-state)?

(3) which variable contributes most to graduation and retention rates when all the variables listed in question (2) are considered?

Methods

For the purposes of this study, all undergraduate degree-seeking students who enrolled at this institution for the first time in the fall 1994 were selected for the study. Of this group, 2545 were first-time freshmen and 1194 were transfers. Table 1 displays background information for native students and transfers respectively. More than half (54.9%) of the native students were female while less than half (47.6%) of the transfers were female. Only around one quarter (25.7%) of the transfer students were from out of state compared to 33.4 percent of native students. The racial components of transfers and native students were similar. Around 15 percent of the students in both groups were minority students. Not surprisingly, native students were more likely younger than transfers. More than three quarters (75.6%) of native students were under 20 years old when they first enrolled at The University of Alabama, while almost three quarters (72.8%) of transfers were 20 years old or older.

Table 1

Enrollment Status by Sex, Residential Status, Race, and Age (94 Fall)

		Sex		*Residential Status*		*Race*			*Age*		
		Female	Male	Out of State	In State	White, non-Hispanic	Africa American	Other	15-19	20-24	25 or older
Transfer	n	568	626	307	887	1025	115	54	325	695	174
	%	47.6%	52.4%	25.7%	74.3%	85.8%	9.6%	4.5%	27.2%	58.2%	14.6%
Native	n	1398	1147	849	1696	2164	300	81	2501	28	16
	%	54.9%	45.1%	33.4%	66.6%	85.0%	11.8%	3.2%	98.3%	1.1%	0.6%
	n	1966	1773	1156	2583	3189	415	135	2826	723	190
Total	%	52.6%	47.4%	30.9%	69.1%	85.3%	11.1%	3.6%	75.6%	19.3%	5.1%

Over sixty percent (61.6) of transfer transfers attended 2-year community colleges before coming to The University of Alabama. The rest of the transfer students attended 4-year institutions. In order to examine the effects of transfer hours on graduation and retention rates, transfer students were grouped into four different transfer statuses according to the number of credits transferred to the institution. Transfers were classified as freshmen if they transferred 32 or fewer credits, as sophomores if they transferred between 33 to 64 credits, as juniors if they transferred between 65 to 96 credits, and as seniors if they transferred 97 or more credits. According to this criterion, 30.2 percent of transfers were classified as freshmen, 44.6 percent as sophomores, 20.3 percent as juniors, and 4.9 percent as seniors (Table 2).

Table 2

Transfer Status

Transfers	*n*	*%*
Freshmen (32 or fewer credits)	361	30.2
Sophomores (33-64 credits)	533	44.6
Juniors (65-96 credits)	242	20.3
Seniors (More than 96 credits)	58	4.9
Total	1194	100.0

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The outcomes of interest are graduation and retention, specifically after four and six years. Students are considered graduated if they have earned a baccalaureate degree any time through the fall 2000 semester. Students who re-enrolled after receiving a degree are counted as graduated. Retention in this study refers to the phenomenon that students who entered the institution in fall 1994 semester continued to enroll at the institution or graduated within six years. Thus, the retention rate is defined as ((Returned + Graduated) / Originally Enrolled)* 100. The main variables of interest are initial enrollment status (freshman or transfer), number of credits transferred (four academic categories), academic performance that is measured by first semester GPA, second semester GPA and UA cumulative GPA, and demographic background variables composed of sex, ethnicity, residency, and age.

Various statistical analyses were used in this study. To answer the first research question, if transfers graduate and persistent at the same rate as native students, Crosstab analysis was performed. Because graduation and retention variables are nominal, this study implemented Chi-Square tests to examine the differences in graduation and retention status among native students and four groups of transfer students.

LISERL 8.51 was used for structural equation model tests. Variable names used in the model are listed in brackets and are underlined. Graduation models and retention models were developed for both native students and transfer students. Each model included academic performance (*AcaPerfm*), background (*Backgrn*), graduation (*Graduatn*) or retention (*Retentn*) as latent variables. Latent variables are not directly measurable but are inferred (Lomax, 1997). The latent variable *AcaPerfn* is measured by first term GPA (1stTMGPA), second term GPA (2ndTMGPA), and UA cumulative GPA (UAGPA). The latent variable *Backgrn* is a construct based on ethnicity (Ethnic), sex (Sex), age (Age), and residency status (Residenc). In the models for transfer students, Backgrn is also measured by transfer status (TranStat) in order to examine the effect of transfer hours on graduation and retention status. The latent variable *Graduatn* is a construct of 4-year graduation status (Graduatn4) and 6-year graduation status (Graduatn6). Since 3-year and 5-year retention rates did not vary much from 2-year or 6-year respectively (see Table 5 &6) and had consistent patterns with other years' retention rates, the latent variable *Retentn* is a construct of 1-year retention status (Retentn1), 2-

year retention status (Retentn2), 4-year retention status (Retentn4), and 6-year retention status (Retentn6).

Path coefficients, which indicate the direct effect of a latent independent variable on a latent dependent variable, are compared to determine the importance of each measure. This study examined and compared path coefficients of the latent independent variables *Backgrn* and *AcaPerfm* to the latent dependent variable *Graduatn* and *Retentn* to determine any direct effects of student academic performance and background factors on graduation or retention and the better factor contributing to graduation and retention.

A goodness-of-fit χ^2 usually provides a useful basis for making decisions on the fit of a model. However, χ^2 is sensitive to sample size. "With large enough samples, substantively trivial discrepancies can lead to rejection of an otherwise highly satisfactory model; with small enough samples, χ^2 can be nonsignificant even in the face of gross misfits" (Loehlin, 1998, p.68). Lomax (1997) affirmed Loehlin's finding that χ^2 tends to reject a model with a large sample size, even when the model fits. For this reason, researchers recommended a population-based model fitness index called Root Mean Square Error of Approximation (RMSEA). RMSEA is relatively insensitive to sample size. It is zero for a perfect fit but a value of the RMSEA of about .05 or less indicates a close fit of the model (Loehlin, 1998; Browne & Cudeck, 1993). Because the sample sizes for native students (2545) and transfer students (1194) are both very large, this study adopted RMSEA as the index for model fitness tests.

Findings

Transfer students, as a group, had a significantly higher 4-year graduation rate than native students (Table 3 and 4). As expected, given the advanced status when entering the University, the 4-year graduation rates of transfer sophomores, juniors, and seniors were significantly higher than native students. Transfer freshmen had a lower 4-year gradation rate than native students though the graduation difference was not statistically significant.

Table 3

Graduation Rates Comparisons

	4-Year	*6-Year*
	%	%
Native Students	30.5%	60.3%
Transfers	43.1%	50.8%
Freshman	26.0%	39.9%
Sophomore	50.5%	56.3%
Junior	50.8%	54.1%
Senior	50.0%	53.4%

Table 3 and Table 4 paint a different picture of 6-year graduation rates for native and transfer students from the 4-year graduation rates. Native students had higher graduation rates than transfer students both as a group and with each transfer status. However, the 6-year graduation rate difference was significant only between native students and transfer freshmen.

Table 4

Chi-Square Tests of Graduation Rate by Native Student and Transfers

			Pearson χ^2 *Value*	*Asymp. Sig. (2-sided)*
4-year Graduation	Native Students vs.	Transfer Student	54.525	0.000*
		Transfer Freshmen	2.988	0.084
		Transfer Sophomores	74.185	0.000*
		Transfer Juniors	40.161	0.000*
		Transfer Seniors	10.103	0.000*
6-year Graduation	Native Students vs.	Transfer Student	33.447	0.000*
		Transfer Freshmen	57.069	0.000*
		Transfer Sophomores	3.619	0.057
		Transfer Juniors	3.389	0.066
		Transfer Seniors	2.263	0.132

*The mean difference is significant at the .001 level.

Table 5 presents the retention rates of native students and transfer students. From the first year to the sixth year, native students have had higher retention rates than transfer

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students regardless of the credit hours transferred. The retention rate difference between native students and transfer students, as a group, was statistically significant. However, Table 6 indicates that the low retention rate of transfer freshmen resulted in the significant retention rate difference between native and transfer students as a whole. A transfer student that transferred with 32 or more credit hours was as likely as a native student to persistent in higher education.

Table 5

Percentage Distributions of Retention Rates

	1-Year	*2-Year*	*3-Year*	*4-Year*	*5-Year*	*6-Year*
Native Students	82.6%	71.4%	69.1%	65.7%	63.5%	63.9%
Transfers	75.0%	64.9%	58.4%	55.4%	53.4%	53.1%
Freshman	64.8%	53.5%	48.8%	45.7%	42.4%	42.9%
Sophomore	79.7%	71.3%	64.0%	61.4%	59.2%	58.7%
Junior	79.3%	68.2%	60.7%	57.4%	56.2%	56.2%
Senior	77.6%	63.8%	56.9%	53.4%	55.2%	51.7%

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Table 6

Chi-Square Tests of Graduation Rate by Native Student and Transfers

			Pearson χ2 Value	*Asymp. Sig. (2-side*
1-Year Retention	Native Students vs.	Transfer Students	29.499	0.000*
		Transfer Freshmen	63.706	0.000*
		Transfer Sophomores	2.517	0.113
		Transfer Juniors	1.649	0.199
		Transfer Seniors	1.001	0.317
2-Year Retention	Native Students vs.	Transfer Students	15.880	0.000*
		Transfer Freshmen	47.433	0.000*
		Transfer Sophomores	0.001	0.997
		Transfer Juniors	1.083	0.298
		Transfer Seniors	1.581	0.209
3-Year Retention	Native Students vs.	Transfer Students	41.277	0.000*
		Transfer Freshmen	58.661	0.000*
		Transfer Sophomores	5.283	0.022
		Transfer Juniors	7.093	0.008
		Transfer Seniors	3.920	0.048
4-Year Retention	Native Students vs.	Transfer Students	36.717	0.000*
		Transfer Freshmen	54.570	0.000*
		Transfer Sophomores	3.725	0.054
		Transfer Juniors	6.691	0.010
		Transfer Seniors	3.788	0.052
5-Year Retention	Native Students vs.	Transfer Students	34.652	0.000*
		Transfer Freshmen	59.419	0.000*
		Transfer Sophomores	3.113	0.078
		Transfer Juniors	5.099	0.024
		Transfer Seniors	1.709	0.191
6-Year Retention	Native Students vs.	Transfer Students	39.286	0.000*
		Transfer Freshmen	58.267	0.000*
		Transfer Sophomores	4.967	0.026
		Transfer Juniors	5.563	0.018
		Transfer Seniors	3.601	0.058

*The mean difference is significant at the 0.001 level.

The main purpose of this study was to develop structural equation models to examine the factors that affect graduation and retention status. LISERL 8.51 tested four structural equation models. Each model was evaluated by RMSEA to determine if the model fit and the final models accepted when the values of RMSEA (less than 0.05)

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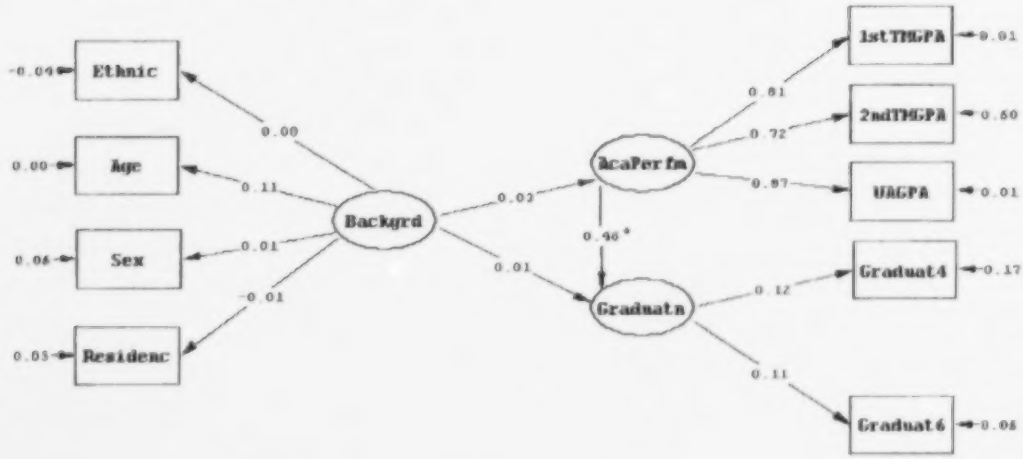
indicated a fit. Some modifications were made to the models to reduce residuals. Each of the four models discussed below found that students' first term GPA contributed most to the latent variable students' academic performance.

Graduation structural equation models were developed for native and transfer students respectively. Figure 1 displays the graduation model for native students. Both student background and academic performance factors contributed almost a quarter of the variance in graduation ($R^2_{AB\text{-}G} = 0.23$). While student background factor was not significant for native student graduation, student academic performance was a strong factor for native students' graduation.



Chi-Square=512.74, df=32, P-value=0.00000, RMSEA=0.011, N=2545, $R^2_{AB\text{-}G} = 0.23$

Figure 1. Graduation Model for Native Student
*Significant at 0.001 level.

Figure 2 presents a structural equation model for transfer student graduation. Both student background and academic performance explained 36 percent of the variance of graduation. The native student graduation model found that academic performance had a strong effect on transfer student graduation. What differs from the native student graduation model is that student background, where the credit hours that transfer students had transferred were considered, affected transfer student graduation status. Unlike in native student graduation model, student background had significant effect on academic performance.

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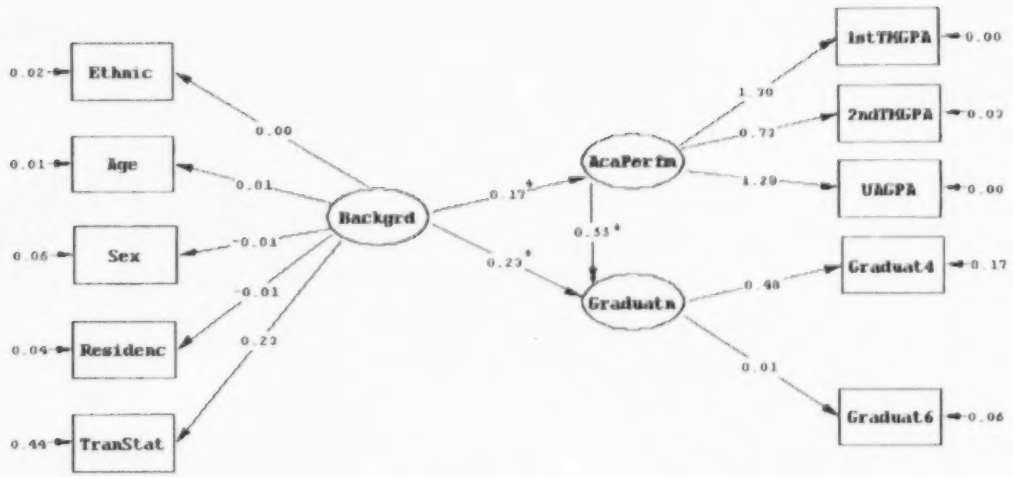

Chi-Square=477.65, df=32, P-value=0.00000, RMSEA=0.040, $N=1194$, $R^2_{ABG}=0.36$

Figure 2. Transfer Student Graduation Model
*Significant at 0.001 level.

Retention models were developed and tested for native and transfer students respectively. The models are displayed in Figure 3 and Figure 4. In the native student retention model, student background and academic performance factors accounted for 25 percent of the variance. Differing from the native student graduation model, both background and academic performance were significant retention factors for native students. The path coefficient from background to retention and the factor loading from background to residency status were negative. This suggests that out-of-state native students were less likely to be retained at the university than in-state students.

Figure 4 displays a picture for interactions among latent variables in the retention model for transfer students. Student background and academic performance together explained 18 percent of the transfer student retention status variance. Transfer student academic performance affected their retention status significantly. Transfer student background, however, did not directly affect their retention status, although it did have a significant effect on transfer student academic performance, which affected their retention status indirectly.

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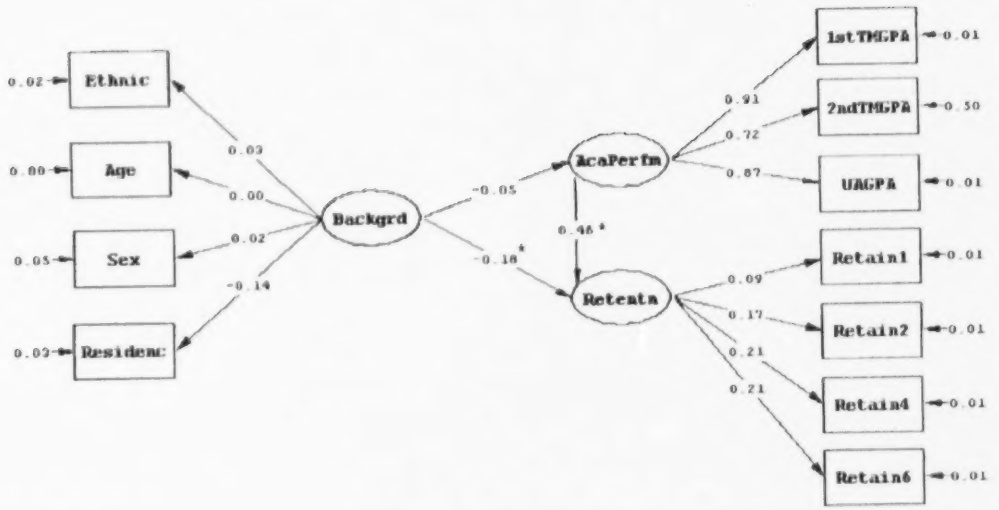
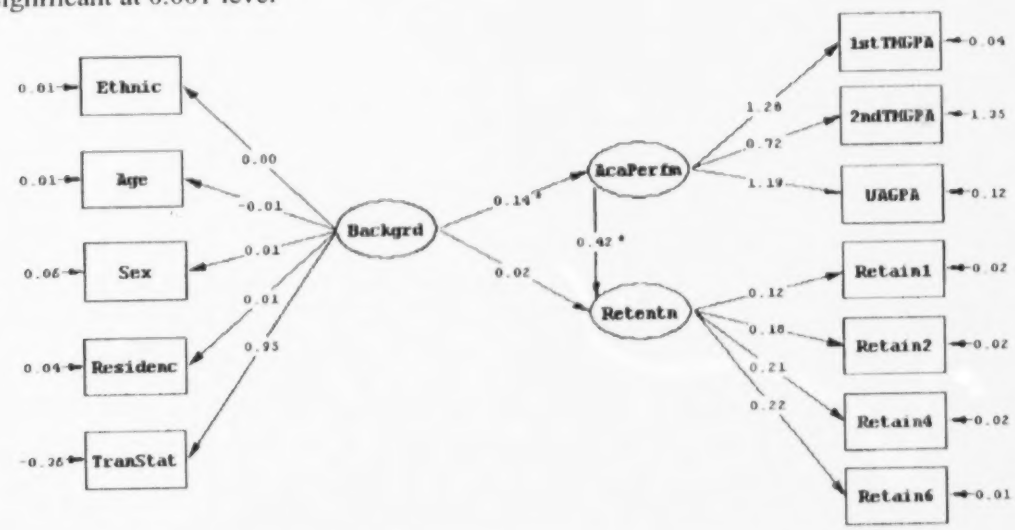


Chi-Square=440.75, df=41, P-value=0.00000, RMSEA=0.0076, N=2545, $R^2_{AB-R} = 0.25$

Figure 3. Native Student Retention Model
*Significant at 0.001 level



Chi-Square=289.38, df=49, P-value=0.00000, RMSEA=0.017, N=1194, $R^2_{AB-R} = 0.18$

Figure 4. Transfer Student Retention Model
*Significant at 0.001 level.

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Conclusion

This study agrees with other studies that first term academic performance is crucial for both native and transfer students in terms of their graduation and persistence. It also asserts that transfer credit hours do make a difference in graduation and retention rates. Transfer students who transferred less than 32 credit hours are less likely to graduate than native students, while transfer students with 32 or more credit hours transferred graduate at a significant higher rate within 4 years than native students. Structural equation models also indicate that transfer credit hours have a strong effect on transfer student graduation and retention rates. In agreement with other studies, student ethnicity, sex, and age had no effect on student graduation or retention rates but student academic performance did.

Significance of the study and further study

This study examines differences between native and transfer students in terms of graduation and retention rates and identifies the factors that impact persistence in higher education. The significance of the study lies in developing and testing a systematic and comprehensive model to determine the extent to which various factors interact and influence graduation and retention rates. This information will provide useful insights for constructive recommendations by administrators in higher education that deal with graduation and retention issues. This study is limited by using data from one institution. Thus, it is not sufficient to portray a national picture of differences between native and transfer graduation and retention rates. Other variables, such as academic preparedness, college environment, and socioeconomic factors need to be included in future models.

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